SHUTTER SERVICE MANUAL
TYPE, COPAL SQUARE S.

I. Function

1) Bounding of Lead Blade and Heavy Start Action in Shutter Charging

Bounding of lead blade comes out in case pressure power by A4-11178 Shock Absorber for Blade (corresponds to S-4: Fig. No. on Technical Illustration with Parts List.) against AA4-11104 Lead Blade Sub-assembly (S-25) is weak. When the pressure power is too strong, start action in shutter setting becomes heavy.

2) Blades Wrongly Shut, Collision of Blades, Bounding of Following Blade

Make adjustment by AA4-11156 Cover Sub-assembly (S-3) so that the clearance between blade rivet head of the end of arm on AA4-11126 Following Blade Sub-assembly (S-26) and oblong projection of blade rivet head on AA4-11156 Cover Sub-assembly (S-3) will become less than 0.05 mm. In case cover projection holds down rivet head excessively, shutter start action becomes heavy when setting. Also, clearance between blades sometime widens.

3) Arrangement of B-Block (Gear position matching)

i) Bring AA4-11202 Control Cam Sub-assembly (T-24) to left rotation stop position.

ii) Match index of A4-11217 Driving Gear (T-19) with index of AA2-1124 Main Plate Sub-assembly (T-29).

iii) Mesh 2 threads of A4-11240 Set Gear B (T-6) on A4-11217 Driving Gear (T-19).

4) Arrangement of C Block (Cam position matching)

i) Bring Following Blade Release Lever of AA3-1121 Sub-plate Sub-assembly (T-15) to the maximum pushed out position by A4-11266 Following Blade Release Cam (T-22) while rotating A4-11209 Shutter Speed Setting Shaft (T-23).

ii) Fit each parts of C27 ~ C22 in the directions as illustrated.

II. Performance

1) Adjustment of Blade Speed and Irregular Exposure

Blade speed adjustment is to be made by making adjustment of spring torque of A4-11171 Blade Driving Spring (S-16) through A4-11164 Ratchet wheel A (S-15): proper blade speed is 7 ± 3 ms. Blade speed changes in case there is blade squeak, oil shortage, or deformation on AA4-11602 X-lever Sub-assembly, AA4-11156 Cover Sub-assembly.

2) Adjustment of Exposure Time

i) Adjustment at 1/1 sec.

Make adjustment of spring torque of A4-11286 Main Spring (T-17) through spring adjusting ratchet B of AA3-1121 Sub-plate Sub-assembly (T-15): 900 ms - 1,000 ms is adequate.

ii) Adjustment at 1/1000 sec.

Make adjustment of the time of disengagement between Following Blade Release Lever of AA3-1121 Sub-plate Sub-assembly (T-15) and Auxiliary Arm of AA4-11126 Following Blade Sub-assembly by means of bending the hook of Following Blade Release Lever.

(Note) Rectification at 1/1000 sec. makes correction at 1/500, 1/250 unnecessary. Lead Blade Release Lever shall not be rectified in principle.

iii) Adjustment at 1/2 ~ 1/125

After adjustments of above (i) (ii), make adjustments at 1/2 ~ 1/125 sec. Adjustment in this category is to be made by striking out or rubbing down tight Shutter Speed Cam.

3) Remedy of Irregular Action

Correct the play between Following Blade Release Lever of AA3-1121 Sub-plate Sub-assembly and Auxiliary Arm Hook of AA4-11126 Following Blade Sub-assembly to an extent of 0.1 mm - 0.2 mm at the time A4-11325 Release Lever (M-41) is hooked by AA2-11332 Hooked Cam Sub-assembly. Also, irregular action increases in case actions of AA4-11104 Lead Blade Sub-assembly (S-25) and AA4-11126 Following Blade Sub-assembly are heavy. Above modification brings down occurrence of irregular action to less than 15%.

4) Adjustment of Synchronization

i) Adjustment of M Time Lag

Adjustment is to be made by correction of transferable contact point of AA3-1162 Synchro Block Sub-assembly (M-20).

ii) Adjustment of X Time Lag

Adjustment is to be made by correction of contact section of AA4-11653 X-contact Sub-assembly (S-8)

5) Adjustment of Self-timer

Adjustment is to be so made that Timer Stop Lever of AA4-11553 Device Action Block Sub-assembly (M-31) will hold the gear not to start moving when the timer unit is set, and that the timer stop lever does not touch the gear cog ends while the timer in action, rectifying holder part of stop lever.

Please refer to the following standard procedures for assembling and adjusting of shutter.

1. Process Name: Set Gear A Assembly

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Place roller shaft in jig with the stepped side on top.	Pincettes assembly jig 411241-K1.	Refer to Fig.1 of page 26.	
2	Apply grease (G4) to roller shaft (stepped side only).	Small brush		Very small amount.
3	Insert roller into shaft.	Pincette		Be certain to place chamferred side down.
4	Tighten plate screw M1.4 x 1.4	Screw-driver		Tightening torque: must be 600 g-cm or more.
5	Check operation after assembly. Gear B must rotate smoothly and effortlessly when roller is swung with a pair of pincette.	Pincette	Refer to Fig.2 of page 26.	When swung with a pair of pincettes, gear shall rotate around the roller.
	Set gear design differs by type.			

	#240	#241	#242
No. of Gears	30	28	30
Width	2.2	1.6	1.6
O. D.	12.8	12.0	12.8

The roller in #240 set gear A is chamferred.

Note that the number of gears given in the table at left are not those actually provided.

The number of gears provided actually provided on each type are as follows:

#240: 19
#241: 18
#242: 19

2. Process Name: Assembly of Sub-plate Sub-assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Assemble ratchet pawl spring.	Pincette	Refer to Fig.3 of page 26.	Secure spring hook portion firmly.
2	Apply grease to lever shaft.	Small brush	Refer to Fig.4 of page 26.	After applying a thin film of G4 grease, see to it that no mass exists on the shaft.
3	Place lead blade release lever spring in such a way as shown in sketch at right; then, insert lead blade release lever into the shaft.	Pincette		
4	Place following blade release lever spring as shown and insert lead blade release lever into the shaft.	Pincette	Refer to Fig.5 of page 26.	
5	Secure lead and following blade release levers in position using roller screws.			Tightening torque for lead and following blade release levers shall be 600 g-cm or more.
6	Mount the lead and following blade release lever springs onto the spring hook portion.	Pincette	Refer to Fig.6 of page 26.	Best assembly sequence is: First hook spring hook portion onto the lever and then mount the other end in the spring hook portion using a pair of pincettes.
7	Check parts concerned for proper operation. o Operation of ratchet pawl. o Operation of lead and following blade release levers.		Refer to Fig.7 of page 26.	There should be no creaking occurring from the pawl and lever. Also there should be no hooking section or point on neither pawl nor lever.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
8	Cement one end of spring.	Syringe	Refer to Fig.8 of page 26.	Attach spring to sub-plate without exerting undue force.

3. Process Name: Assembly of Main Plate Sub-assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Hook M-lever spring onto the M-contact sub-assembly.	Pincette	Refer to Fig.9 of page 26.	Portion A (see Fig.) of M-lever spring should be hooked onto M-lever, and portion B thereof placed in contact with the bent portion of M-lever.
2	Secure M-contact to the M plate placed on the jig. Tightening torque shall be 600 g-cm or more.	Assembly jig K-11839. Pincette Screw-driver	Refer to Fig.10 of page 26.	When M-contact sub-assembly is secured to the plate, M-lever shall be located outside the M-contact.
3	Hook one end of M-lever spring to the main plate.	Pincette	Refer to Fig.11 of page 26.	Pull out portion B of M-lever spring from a place between the plate and M-lever by means of a pair of pincettes. Then hook this portion to the plate.
4	Place M-control lever spring in position.	Pincette	Refer to Fig.12 of page 26.	Longer end of M-control lever spring shall be hooked onto the plate, and shorter end to M-lever.
5	Check M-lever and M-control lever for proper operation.	Hand		

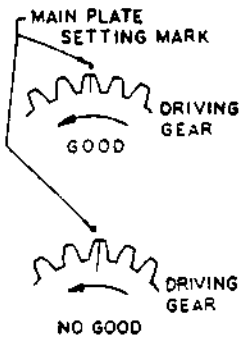
1. Process Name: Control Governor Assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Place main plate sub-assembly in jig with its columns side down.			Plate columns shall be four pieces of long ones.
2	Set control governor assembly to the position of tapped holes.	Pincette		
3	Tighten flat screw 1.4φ x 1.4 at two points. Tightening torque shall be 600 g-cm or more.	Pincette Screw-driver	Refer to Fig.13 of page 26.	Flat screw must be used. (Threaded portion rather small.)
4	Tighten screw for setting gear plate. Tightening torque shall be 600 g-cm or more.	Pincette Screw-driver Syringe		After tightening, attach its head using "Semi Bond".
5	Operation Check: Flip the tip-end of control lever by finger.			See to it that no creaking or unsmooth operation should occur, nor that abnormal sound should develop.
	Main plate sub-assembly differs by configuration. #240 and #241 are identical. #242 has two camera body mounting holes on it.		Refer to Fig.14 of page 26.	

2. Process Name: Assembly of Shutter Speed Setting Shaft.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Apply G4 grease to shutter speed setting shaft hole of main plate sub-assembly.			
2	Place washer (3.1ϕ x 0.1) on shutter speed setting shaft hole of main plate sub-assembly.	Pincette		
3	Place shutter speed setting shaft into control cam and then insert this sub-assembly into shutter speed setting shaft hole of main plate sub-assembly.	Pincette	Refer to Fig.15 of page 27.	In this case, control lever must not come beneath the control cam when the cam is assembled.
4	Mount following blade release cam on the control cam sub-assembly, making sure that its groove is placed in dowel of control cam.	Pincette		Following blade release cam should be placed with its tail down.
5	Mount lead blade release cam on top of following blade release cam; then set notch of the former to the dowel of control cam sub-assembly.	Pincette		Control lever must be in contact with control cam sub-assembly more than two/thirds the thickness of the cam.
6	Force returning secured to control cam sub-assembly against the slide plate dowel.	Pincette	Refer to Fig.16 of page 27.	Apply a thin film of G4 grease to shutter speed setting shaft, lead blade release cam sub-assembly, and following blade release cam sub-assembly. Control cam shall be on the specified side only.

3. Process Name: Driving Shaft Assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Assembly driving shaft with driving gear.		Refer to Fig.17 of page 27.	Move driving gear in the direction of arrow (Refer to Fig.17 of page 27) and then insert it into the shaft with shallower groove side innerwards.
2	Insert driving shaft into driving shaft hole of main plate sub-assembly, while keeping driving gear in engagement with idle gear. (Refer to Fig.18 of page 27.)	Pincette		When engaging gears, be sure to place returning cam on the dowel of slide lever in previous assembly. Never fail to check the position of driving gear setting mark and groove where spring is to be seated.
3	Insert driving spring collar into driving shaft.	Pincette		Rotate driving gear in the direction of
4	Place driving spring in position with its lower end into the groove.	Pincette	Refer to Fig.18 of page 27.	Main plate setting mark.
5	Insert washer(2ϕ x 0.1) into the head of driving shaft.	Pincette		
	P.S. Apply a thin film of G4 grease to the entire driving shaft.			

4. Process Name: Assembly of Sub-Plate Sub-assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Check operation of both lead and following blades.	Pincette		
2	Set sub-plate sub-assembly to mounting hole. Assembly Sequence: a. Insert column into sub-plate hole. b. Set hole of shutter speed setting shaft to that of driving shaft. c. Hold the hole portion of shutter speed setting shaft by hand. d. Set hole of following blade release cam to that of lead blade release cam and insert them into the hole of sub-plate sub-assembly in that order while holding them by a pair of pincettes.	Pincette	Refer to Fig.19 of page 27.	
3	Tighten flat screw (1.4 x 2) made of brass. Tightening torque: 600 g-cm or more.	Pincette Screwdriver		
4	Apply cement to the hole of flat screw (1.4 x 1.8) using small brush.	Small brush		Cement should ideally be administered into the hole of flat screw (1.4ϕ x 1.8). Any cement present outside the chamferred portion must be wiped with a cloth.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
5	Tighten flat screw (1.4φ x 1.8). Tightening torque: 600 g-cm or more.	Pincette Screw-driver		
6	Operation Check: Pinch shutter speed setting shaft by fingers as shown in Fig. (Refer to Fig.20 of page 27 and flip main plate sub-assembly by finger of the other hand. In this case, the sub-assembly should rotate slightly about the shutter speed setting shaft.		Refer to Fig.20 of page 27.	Use sacks in fingers to pinch shutter speed setting shaft.
7	Insert one end of driving spring into one of gear teeth while rotating ratchet gear clockwise by a pair of pincettes.	Pincette	Refer to Fig.21 of page 27.	
8	Operation Check: When driving shaft is rotated counterclockwise with a jig or by hand, there shall be no creaking or the like. When hand is let off, it should return smoothly by tension of spring, and ratchet pawl should not come off, or spring ends now hooked on should not come off.		Refer to Fig.22 of page 28.	

5. Process Name: Clich Spring Assembly

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Set clich spring to mounting hole position.	Pincette	Refer to Fig.23 of page 28.	The bent portion of spring should drop into the hole.
2	Apply a small amount of cement to the tip-end of flat screw (1.4φ x 1.4).	Pincette		
3	Tighten flat screw (1.4 φ x 1.4). Tightening torque: 600 g-cm or more.	Pincette Screwdriver		

	Material	Thickness	Surface Treatment
#240	PBS-H	0.3	None
#241	SK_4-M	0.25	FB
#242	SK_4-M	0.25	FB

All these types are identical in configuration.

6. Process Name: Assembly of Body Release Sub-assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Apply G4 grease to body release lever shaft.	Small brush		Small amount suffices.
2	Insert body release lever sub-assembly into the shaft.	Pincette	Refer to Fig.24 of page 28.	
3	Place spring onto the lever.	Pincette	Refer to Fig.25 of page 28.	Longer spring end should be hooked on easily.
4	Secure flat screw (1.4$ x 2.2) to lever shaft and then tighten it down. Tightening torque: 600 g-cm or more.	Pincette Screwdriver	Refer to Fig.26 of page 28.	Do not tighten spring with screw.
5	Hook shorter end of spring onto the hooking portion of lever.	Pincette		
6	Operation Check: Push lever by a pair of pincettes in the direction in which releasing can be made. It is normal when the lever operates smoothly and effortlessly and returns.	Pincette	Refer to Fig.27 of page 28.	

7. Process Name: Set Gear Assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Apply G4 grease to shutter blade plate sub-assembly column.	Small brush	Refer to Fig.28 of page 28.	
2	Put washer (5.1ϕ x 0.1) into the shaft.	Pincette		
3	Fit set gear B into shutter blade plate column.	Pincette	Refer to Fig.29 of page 28.	Gear engaging should be performed with returning cam forced against the dowel of slide lever (driving gear fully turned counterclockwise). Best way to confirm proper engagement, see that tapped hole is in parallel with the third tooth of set gear, as shown.
4	Place washer (3.6ϕ x 2.5) into plate column.	Pincette		
5	Apply G4 grease to slideway on both face of set gear A. In case of #240, be sure to apply grease to inside the chamferred area.	Small brush	Refer to Fig.30 of page 28.	

	#240	#241	#242
No. of Teeth	30	28	30
Width	2.2	1.6	1.6
O.D.	12.8	12.0	12.8

No. of teeth actually provided:

#240 : 19
#241 : 18
#242 : 19

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
6	Place set gear A into plate column and roller shaft into set gear B.	Pincette	Refer to Fig.31 of page 28.	
7	Mount set gear pole into plate column with either end first placed in.	Pincette		
8	Operation Check: Operate set gear A along the periphery of the groove of set gear B. It should move smoothly and without any creaking.		Refer to Fig.32 of page 28.	Check set gear pole with it being fully forced in.

8. Process Name: Assembly of Slide Lever Charge Spring.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Apply G4 grease to (1) dowel contacting face of charge lever hooked cam, and (2) slideway on dowel of slide lever.	Small brush	Refer to Fig.33 of page 29.	
2	Hook slide lever charge spring onto spring hook portion, first from the charge lever end and then the other end.	Pincette		When hooking charge lever, do so with notched side down (main plate side). Hook tip-end of spring onto hooking portion of charge lever as shown in Fig. upward; then, rotate the other end of the spring clockwise by pincettes, while holding ↘ portion by hand, so that charge lever can easily be hooked on.
3	Operation Check; Flip charge lever in such a way that it is pushed upward, and then check spring to see whether or not it comes off or it operates properly.		Refer to Fig.34 of page 29.	

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
				Fig. (center) shows the spring properly hooked on in position.

9. Process Name: Assembly of Release Lever.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Apply G4 grease to lever shaft A.	Small brush		Apply grease, making sure that no other part is covered with it.
2	Place release lever spring in position.	Pincette	Refer to Fig.35 of page 29.	Longer spring end must come towards assembly man when viewed from the side as shown.
3	Mount release lever in position, in such a way that longer end comes on top of the slide lever charge spring.	Pincette	Refer to Fig.36 of page 29.	In this case, it will be more convenient and easier if shorter spring end is hooked on to the lever. See portion ( ) for details.
4	Tighten flat screw (1.4ϕ x 1.8). Tightening torque: 700 g-cm or more.	Pincette Screwdriver		
5	Hook longer spring end to the dowel of spring hooking portion.	Pincette		

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
6	Operation Check: Flip slide lever side of lever. If no creaking is heard, it indicates that operation is normal.		Refer to Fig.37 of page 29.	
7	Apply rokol paste to hooking portion of lever hooked cam.	Small brush		Do not apply the paste to other part or place.

10. Process Name: Assembly of Driving Shaft (2)

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Apply paste to hooked cam.	Small brush	Refer to Fig.38 of page 29.	If release lever is applied with rokol paste in previous process, this procedure may be omitted.
2	Insert hooked cam into driving shaft in direction shown in Fig. Cam shall drop into driving shaft, avoiding the rise of release lever.	Pincette	Refer to Fig.39 of page 29.	In this case, the dowel of cam driving gear must be engaged in a position shown in Fig. All necessary assembly works, insofar as this process is concerned, should be carried out in that condition.
3	Apply rokol paste to B-lever hooked cam.	Small brush	Refer to Fig.40 of page 29.	

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
4	Insert B-lever hooked cam to driving shaft with solid side on top and protruding side down.	Pincette	Refer to Fig.41 of page 29.	
5	Put washer 3.1 ϕ x 0.1 in.	Pincette		
6	Apply G4 grease to M-contact control cam.		Refer to Fig.42 of page 29.	Only to area on the cam as shown in Fig.
7	Insert M-contact control cam into driving shaft with its solid side on top and cut portion on shutter speed setting shaft.	Pincette	Refer to Fig.43 of page 29.	
8	Place washer (3.1ϕ x 1) into driving shaft.	Pincette		
9	Insert slow speed lever into driving shaft with its solid side on top.	Pincette		
10	Apply bonding agent to the tip-end of left-hand side flat screw (1.4ϕ x 1.7)	Pincette	Refer to Fig.44 of page 30.	
11	Tighten left-hand side flat screw (1.4ϕ x 1.7) Tightening torque: 800 g-cm or more.	Pincette Screwdriver		

11. Process Name: Winding of Main Spring.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Wind main spring up to the specified position using winding tool.	Winding tool	Refer to Fig.45 of page 30.	Perform this process with driving shaft detached.
2	Winding range is shown in Fig. Standard range is when ratchet gear portion is within the line connecting driving shaft and lead blade release lever.	(Visually)	Refer to Fig.46 of page 30.	Because this winding is provisional and fine adjustment must be made in subsequent process, care should be taken not to wind it beyond the range shown in Fig. Do not wind more than one turn in direction of winding.

12. Process Name: Assembly of Device Action Block Sub-assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Lubricate timer segment gear shaft with DOS.	Lubricator	Refer to Fig.47 of page 30.	
2	Mount timer retainer E on the main plate sub-assembly.	Pincette	Refer to Fig.48 of page 30.	Set retainer to chamferred portion of main plate sub-assembly with its stepped face down.
3	Operation Check: Check operation of timer stop lever in the device action block sub-assembly. Flip tip-end of stop lever lightly by finger. Its operation is normal if there is no creaking nor dragging, and if it should return by tention of spring.		Refer to Fig.49 of page 30.	

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
4	Mount device action block in main plate sub-assembly. Place timer stop lever in such a way that it comes between slide lever charge spring hool position and dowel of slide lever (1 ϕ x 1.1). See to it that timer lever comes beneath release lever.		Refer to Fig.50 of page 30.	Carefully note the positions of timer stop lever and timer lever. As shown in Fig. it is convenient to determine positions from both sides of lever.
5	Insert screw for sstting gear plate and two flat screws into their respective holes. In this case, apply bonding agent to the tip-end of two flat screws.	Pincette	Refer to Fig.51 of page 30.	
6	Tighten screws at three points. Tightening torque: 700 g-cm or more for screw for setting gear plate. 600 g-cm or more for flat screws.	Screw-driver		

13. Process Name: Assembly of Timer Spring.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Pinch larger ring of timer spring by a pair of pincettes.	Pincette	Refer to Fig.52 of page 30.	

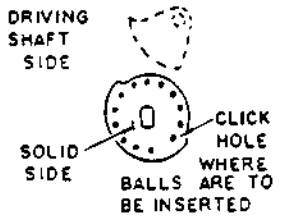
Step	Procedure	Jig and/or Tool Used	Notes	Remarks
2	Hook one end (smaller end) of spring onto spring hook dowel of timer segment gear.	Pincette	Refer to Fig.53 of page 30.	
3	When segment gear side is hooked on, hook the other end thereof to timer spring hook dowel.	Pincette	Refer to Fig.54 of page 31.	
4	Check if the spring is properly hooked on, making sure that segment gear end is positively seated on the groove of dowel.			

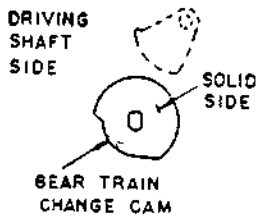
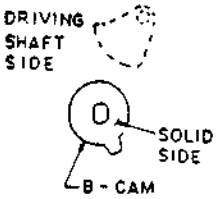
14. Process Name: Timer Operation Check.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Set timer to maximum operating angle.		Refer to Fig.55 of page 31.	See to it that timer is positively set in position. No proper setting may be possible if there is any squeaking or the like in timer stop lever and timer level.
2	Gear should be hooked onto the timer stop lever more than two-thirds of the height of pitch of gear tooth.		Refer to Fig.56 of page 31.	

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
3	Set driving shaft in position.	Pincette	Refer to Fig.57 of page 31.	See to it that timer does not start the moment driving shaft has been set. This may happen if no clearance exists between timer stop lever and slide lever dowel.
4	Release body release lever. Check if anyabnormal operating sound is heard. See to it that timer operates to maximum operating angle positively.			There should never be any wows and flutters. If a space of a. in previous process is large, it is possible that timer stop lever is brought into contact with gear due to vibrations and the like during operation. Therefore, care should be taken to avoid this.
5	Make sure that timer segment gear forces timer lever is, to allow for timer lever hook portion to escape from the slide lever.		Refer to Fig.58 of page 31.	See if release lever is forced up positively and then comes off the hooked cam, thereby causing driving shaft to rotate.
6	See to it that timer continues to operate until segment gear is fully operated to the stopper, even after driving shaft has been released.			It is portable that shock of driving shaft releasing action causes timer stop lever to be hooked onto the gear, thereby stopping timer without it being operated to maximum angle. Thus, care should be taken.

15. Process Name: Assembly of Shutter Speed Setting Shaft.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Apply G4 grease to main plate sub-assembly around shutter speed setting shaft.	Small brush	Refer to Fig.59 of page 31.	
2	Rotate shutter speed setting shaft by hand and locate outermost position (direction of arrow) to which following blade release lever comes to.		Refer to Fig.60 of page 31.	When the outermost position has been located, do not move shutter speed setting shaft.
3	Mount 1.5ϕ ball in main plate sub-assembly.	Pincette		
6	Place washer (3.1ϕ x 0.07) in position.	Pincette	Refer to Fig.61 of page 31.	Make sure that washer does not come into the groove of shutter speed setting shaft.
7	Apply G4 grease to face of anchor cam and ball slide surface.	Small brush	Refer to Fig.62 of page 31.	Grease to be applied to both shall be very small amount.
	Apply G4 grease to the entire periphery of gear train change cam.	Small brush		
	Apply G4 grease to face of protuded portion of B-cam.	Small brush		
8	Insert anchor cam into shutter speed setting shaft with its solid side on top. In this case, note the position of click holes.	Pincette	Refer to Fig.63 of page 31.	

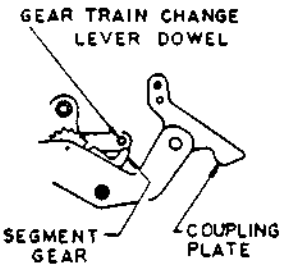
Step	Procedure	Jig and/or Tool Used	Notes	Remarks
9	Insert retainer B (A4-11341) in position.	Pincette		
10	Insert gear train change cam into shutter speed setting shaft with its solid side on top. Round side of gear train change cam comes to driving shaft side.	Pincette	Refer to Fig.64 of page 32.	
11	Insert shutter speed setting shaft retainer C.	Pincette		
12	Insert B-cam with its solid side on top, and protruded side opposite to driving shaft.			

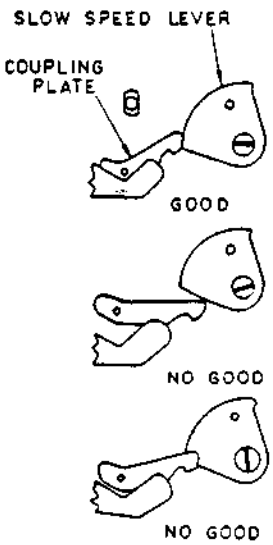
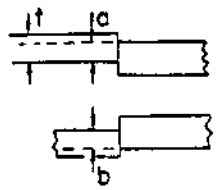
16. Process Name: Main Plate Assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Mount B-lever spring in position. In this case, shorter end must come on B-lever side and longer side on the plate.	Pincette	Refer to Fig.65 of page 32.	This assembly is provisional and, therefore, any squeaking which may exist is not a trouble, because one end of lever spring is hooked on to the plate in subsequent step.
2	Mount the plate in position.	Pincette		Be careful of the positions of M-contact lever and B-lever.
3	Tighten flat screws (1.4 ϕ x 2) at three points. Tightening torque: 600 g-cm or more.	Screwdriver		Remove B-lever spring from the plate. The end now dismounted drops onto the plate pole.

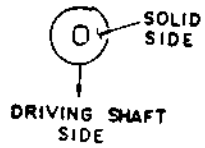
Step	Procedure	Jig and/or Tool Used	Notes	Remarks
4	Remove B-lever spring hooked on the plate.	Pincette	Refer to Fig.66 of page 32.	
5	Operation Check: There shall be no creaking, squeaking, dragging, etc. on B-lever, M-lever, and M-contact lever, Nor is there falling-off of springs.	Pincette		

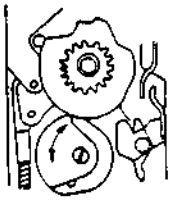
17. Process Name: Assembly of Control Governor Sub-assembly.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Apply G4 grease to tip-end of control governor, dowel sliding portion of segment gear, and cam contacting portion of gear train change lever dowel. Gear train change lever dowel  	Small brush	Refer to Fig.67 of page 32.	When setting control governor sub-assembly to hole, push anchor clutch lever in the direction of an arrow so gear train change lever dowel comes into contact with gear train change cam. Position of control governor gear coupling plate.
2	Set control governor sub-assembly to main plate screw position.			

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
3	Temporarily tighten gear plate setting screw. In this case, loosely tighten screws. Of two screw setting points, one point should be applied with bonding agent.	Pincette Screwdriver	Refer to Fig.68 of page 32.	POSITION OF CONTROL GOVERNOR GEAR COUPLING PLATE 
4	Set gear plate retainer to flat screw hole and insert chamferred portion in between main plate and control governor.	Pincette	Refer to Fig.69 of page 32.	
5	Tighten flat screw with bonding agent applied to its tip-end. Tightening torque: 600 g-cm or more.	Pincette Screwdriver		When tightening, do not apply to much force nor hold it strongly by hand.
6	Tighten gear plate setting screw. Tightening torque: 700 g-cm or more.	Screwdriver		
7	Operation Check: Make sure that when driving shaft is set, control governor returns positively. When released, force coupling plate in without causing slow speed lever to come on top of coupling plate or down.		Refer to Fig.70 of page 32.	Contacting con of control governor and slow speed lever shall be such that portion more than two-thirds of control governor is in contact with slow speed lever.  a and b shall be in contact with each other by more than two-thirdsthickness.

18. Process Name: Assembly of Shutter Speed Setting Shaft (3)

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
1	Insert retainer D into shutter speed setting shaft.	Pincette	Refer to Fig.71 of page 33.	M-contact sub-assembly should be placed with retainer in between.
2	Position solid side of M-contact cam in shutter speed setting shaft in such a way as shown at Fig.71 of page 33.  			This dowel should be in contact with M-contact cam. Dowel should never come beneath the cam.
3	Insert retainer C into shutter speed setting shaft.	Pincette		
4 (1)	FOR FB-240 Insert solid side of shutter speed cam. (Refer to Fig.72 of page 33) Click position shall be 1/2000.	Pincette	Refer to Fig.72 of page 33.	Driving shaft should be assembled with shutter speed cam, with it as being released. Shutter cam is used also for #241.
(2)	Insert shutter speed setting gear to shutter speed setting shaft.		Refer to Fig.73 of page 33.	Shutter speed setting gear (A4-11388).
(3)	Tighten flat screw (1.7 ϕ x 2.5). Tightening torque: 900 g-cm or more.	Screwdriver		
5	Operation Check: (1) Check clockwise and counterclockwise rotations of shutter speed setting shaft. There should be no sequeaking, dragging, nor buurs.		Refer to Fig.74 of page 33.	No extremely large difference in weight should occur in clicks during shaft rotation.

Step	Procedure	Jig and/or Tool Used	Notes	Remarks
	(2) Check the operation of B-lever, M-contact sub-assembly, gear anchor, gear train change lever, etc.			Simply check if it is operating, and no careful checking is not necessary. Arrow in Fig. shows each parts operating direction.
	(3) When dial is set to B position, never rotate slow speed lever to bring it into contact with gear coupling plate.	Pincette	Refer to Fig.75 of page 33.	When tip-end of slow speed lever is operated in the direction of arrow at point near coupling plate.  Coupling plate dowel must not move.
	(4) Set shutter speed setting shaft to one second, and now check operation of body only with body release lever released.			Confirm that slow speed lever rotates at about one second.

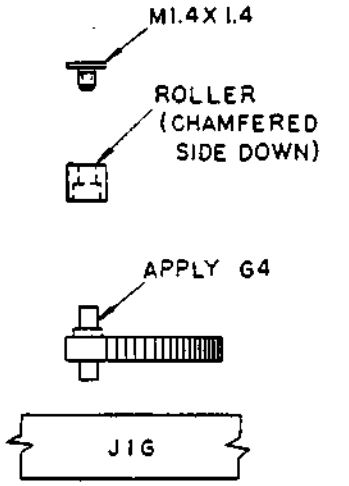


FIG 1

FIG 2

FIG 3

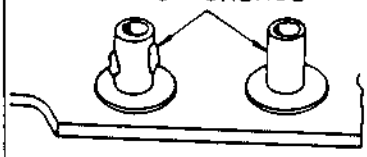
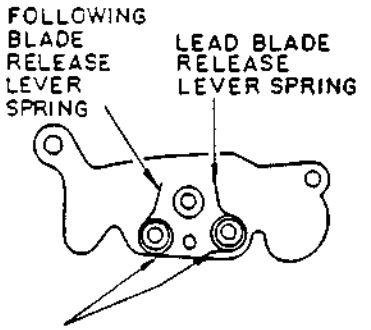
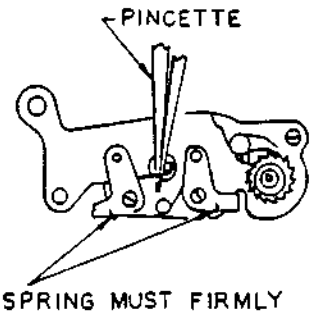


FIG 4



LEAD AND FOLLOWING BLADE RELEASE LEVER CAN BE PUT INTO THE SHAFT MORE EASILY IF SPRINGS ARE PLACED IN SUCH A WAY SHOWN ABOVE

FIG 5



SPRING MUST FIRMLY BE SEATED ON THESE PORTIONS OF THE LEVER

FIG 6

MAKE SURE THAT THE PANEL IS HOOKED FIRMLY AND DOES NOT MOVE BACKWARD

FIG 7

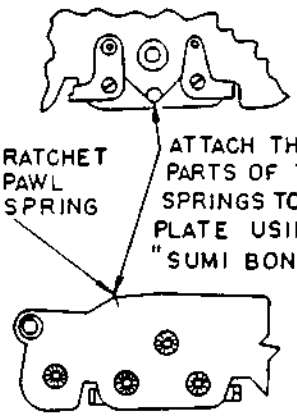


FIG 8

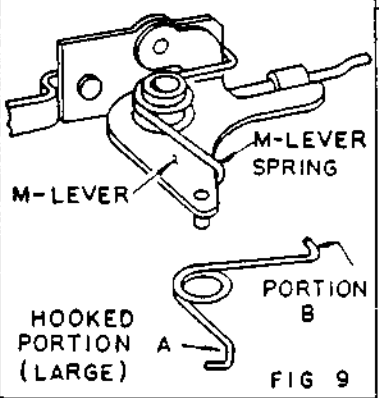


FIG 9

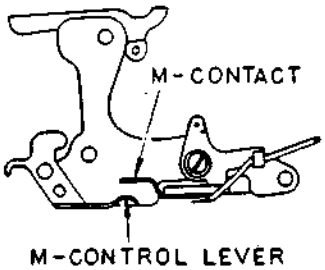


FIG 10

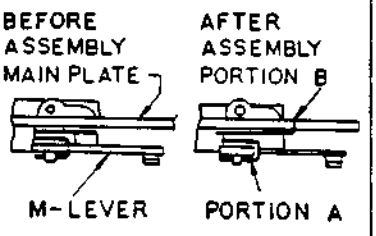


FIG 11

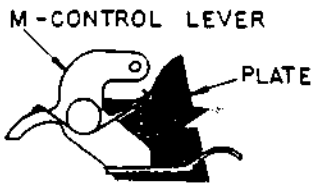


FIG 12

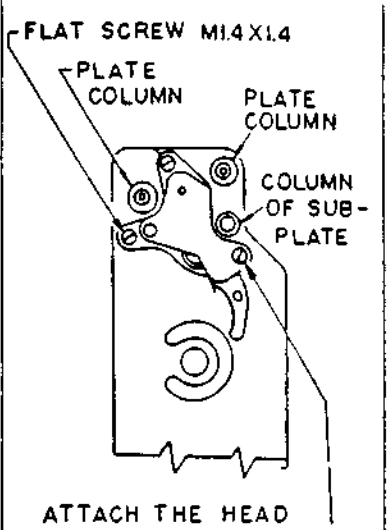
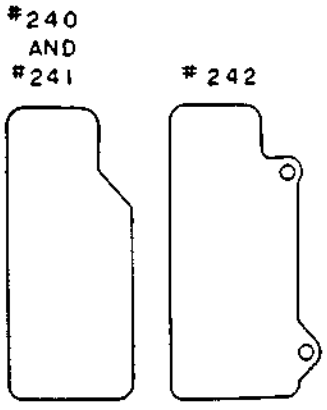
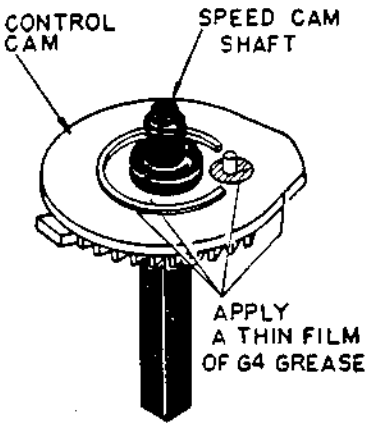


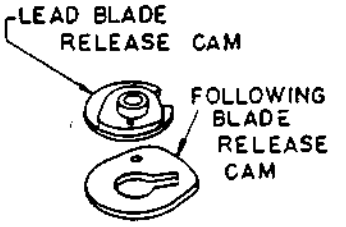
FIG 13



MAIN PLATE SUB-ASSEMBLY DIFFERS ONE FROM ANOTHER DEPENDING ON ITS CONFIGURATION, YOU WILL KNOW WHICH TYPE BY CHECKING CONFIGULATION

FIG 14





CONTROL LEVER MUST BE IN CONTACT WITH CONTROL CAM SUB-ASSEMBLY MORE THAN TWO/THIRDS THE THICKNESS OF THE CAM

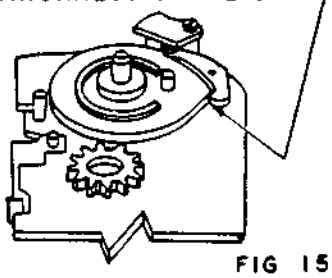
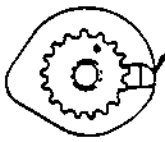


FIG 15



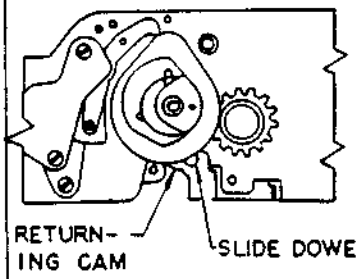


FIG 16

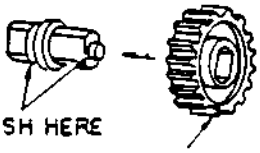
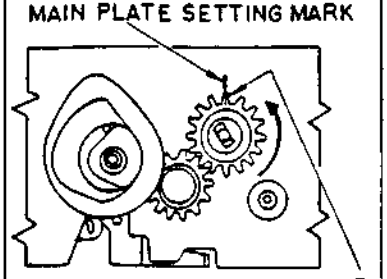
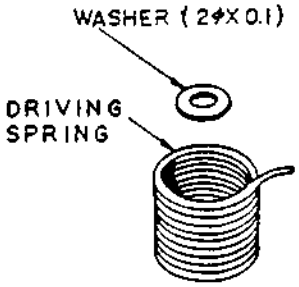


FIG 17



ENGAGE GEARS AT A POSITION WHERE MARKS OF DRIVING GEAR AND MAIN PLATE SET TO EACH OTHER PROPERLY.



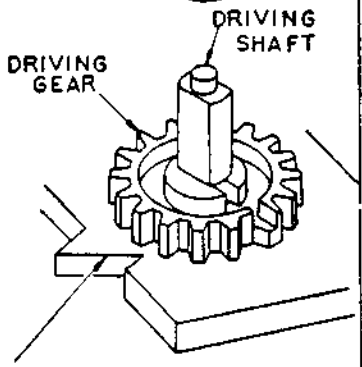


FIG 18

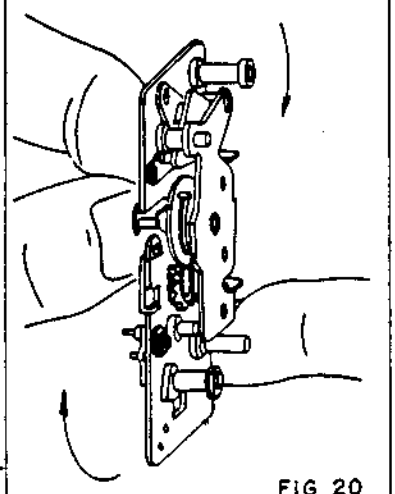


FIG 20

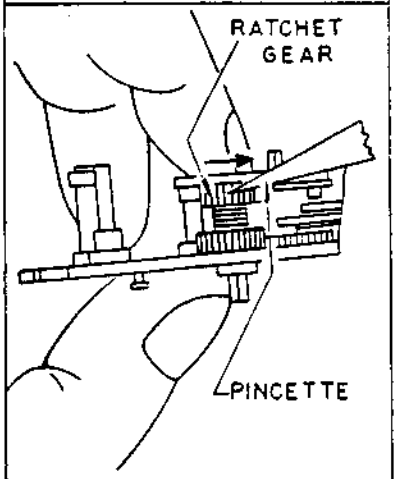
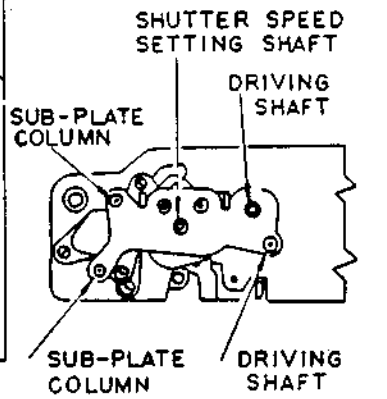
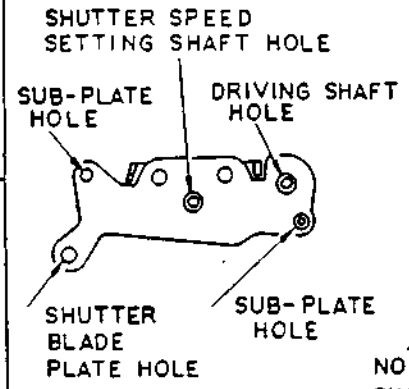
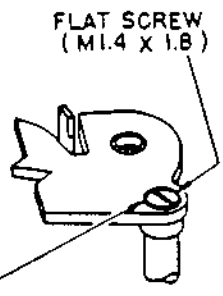


FIG 21







NO OUT FLOW OF CEMENT SHALL BE ALLOWED FROM THE FACE OF SUB-PLATE.

FIG 19

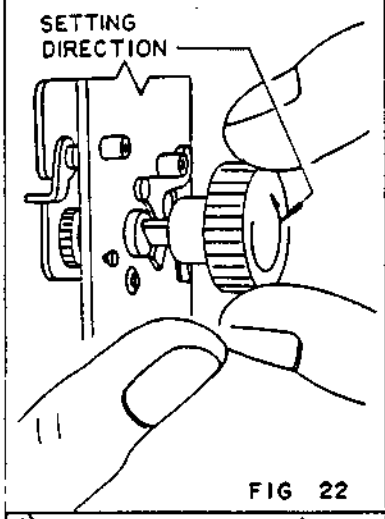
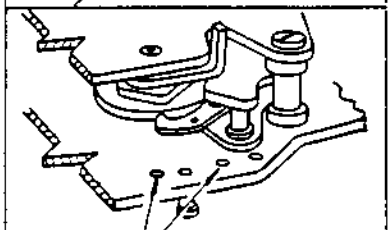


FIG 22



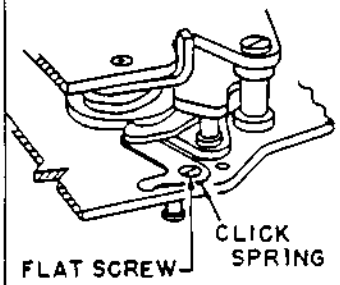


FIG 23

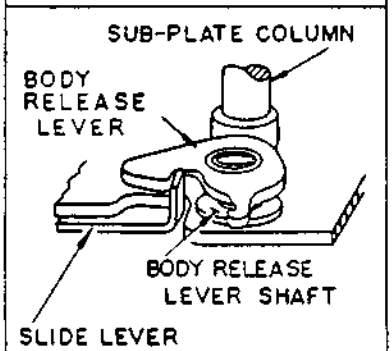


FIG 24

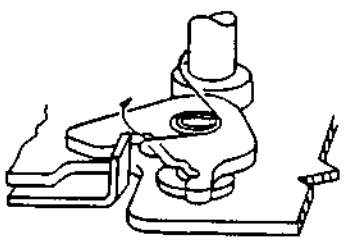


FIG 25

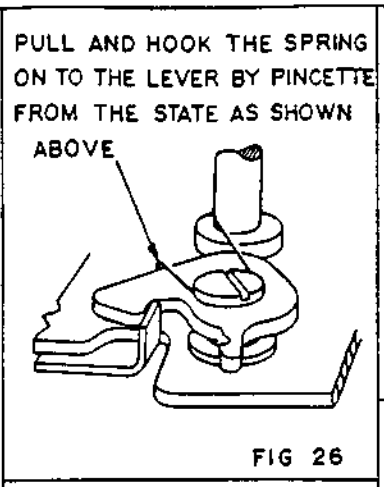


FIG 26

FIG 27

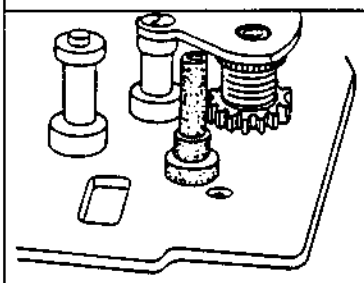
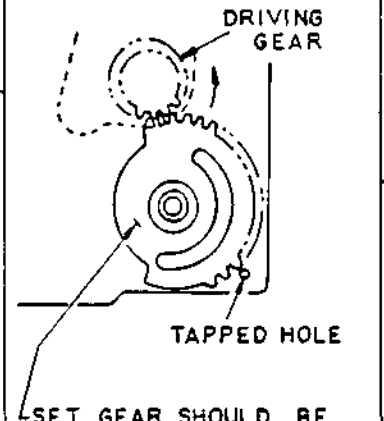


FIG 28



SET GEAR SHOULD BE ENGAGED WITH DRIVING GEAR IN SUCH A WAY AS SHOWN ABOVE, IN OTHER WORDS, TWO TEETH OF SET GEAR MUST ENGAGE WITH TWO TEETH OF DRIVING GEAR.

FIG 29

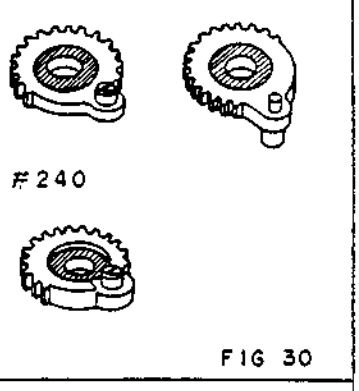
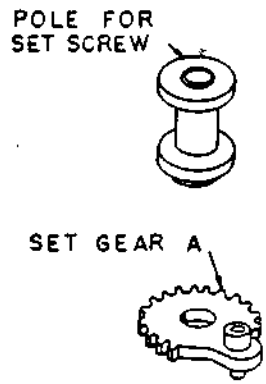


FIG 30



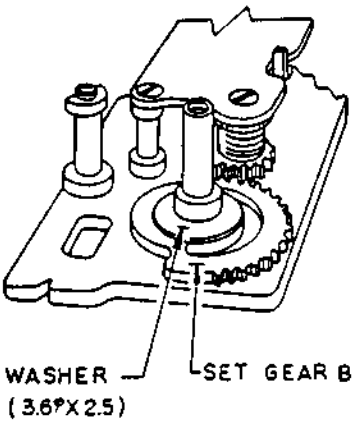


FIG 31

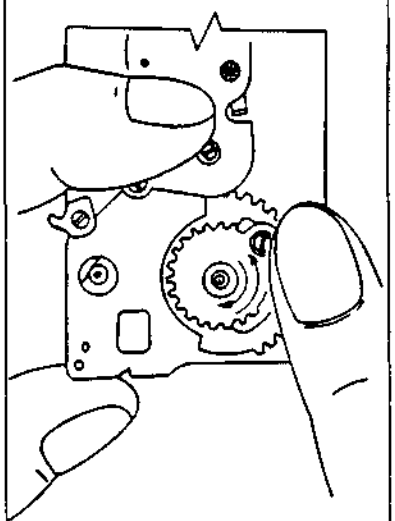
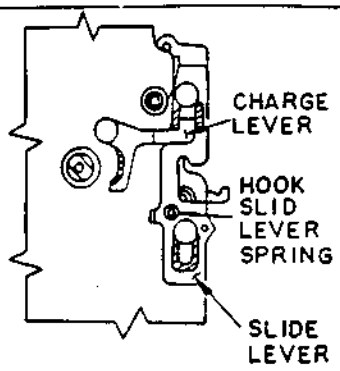


FIG 32



APPLY G4 GREASE TO SHADED AREA

FIG 33

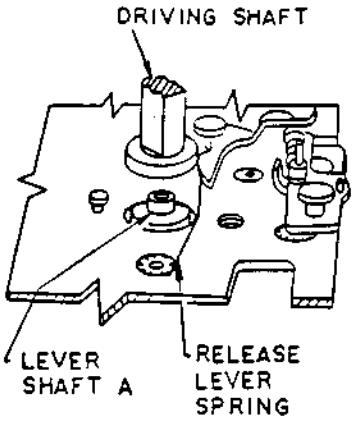


FIG 35

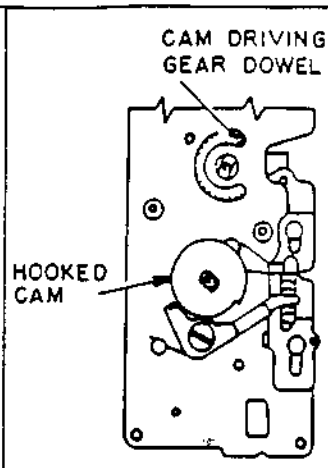
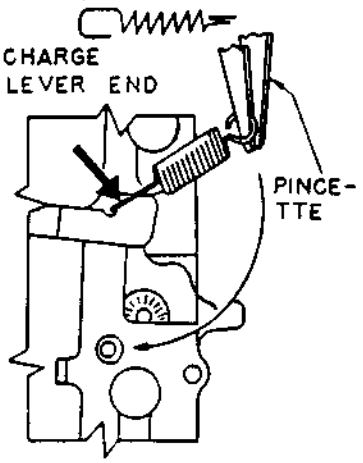
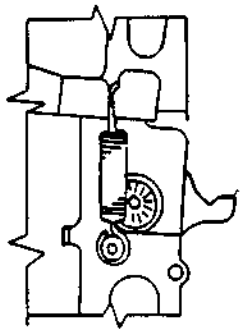


FIG 39

DOWEL SIDE OF SLIDE LEVER





SPRING MUST COME INTO GROOVE COMPLETELY

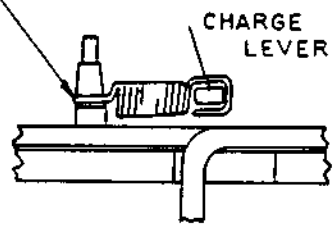


FIG 34

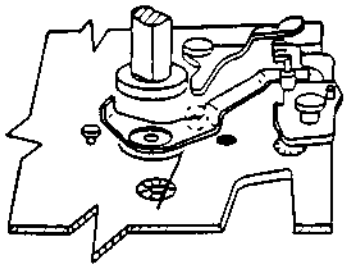


FIG 36

FLIP LEVER IN DIRECTION OF ARROW USING A PAIR OF PINCETTE SO THAT OPERATION CAN NOW BE CHECKED PROPERLY

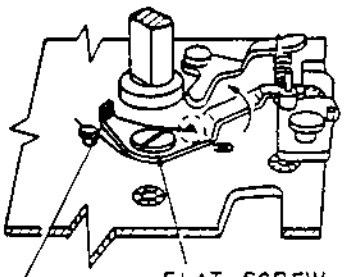


FIG 37

SIDE WHERE ROKOL PASTE TO BE APPLIED

FIG 38

FIG 40

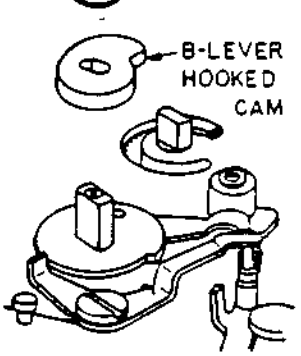


FIG 41

FIG 42

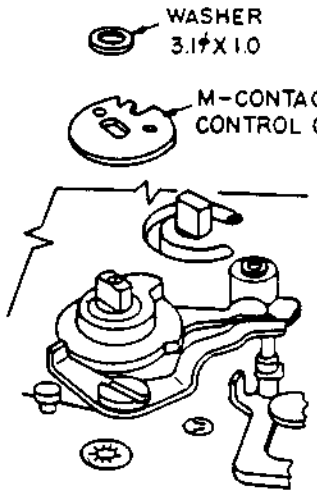


FIG 43

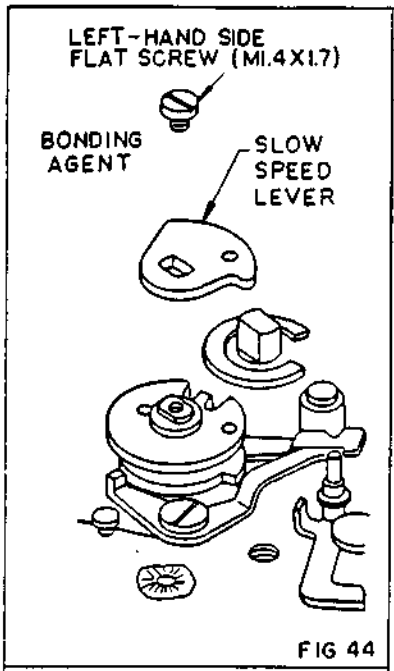


FIG 44

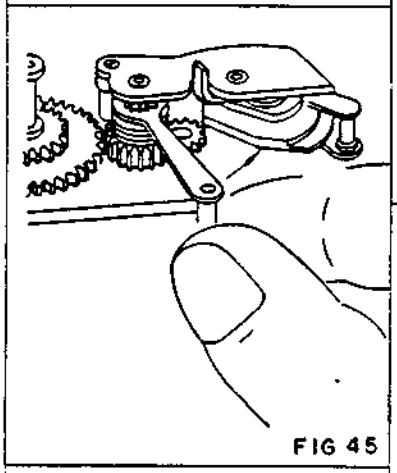


FIG 45

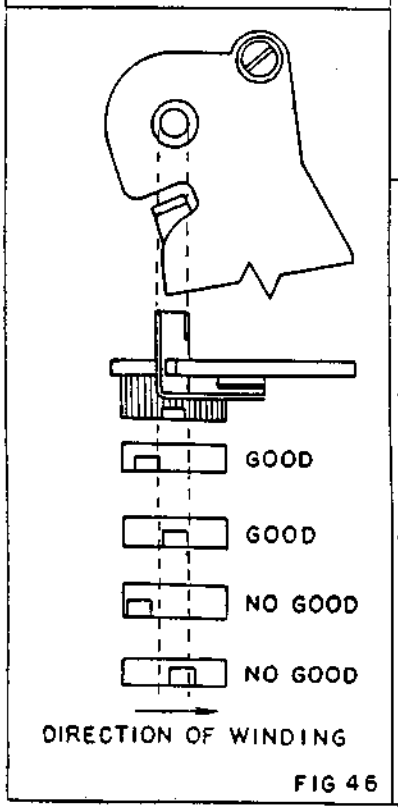


FIG 46

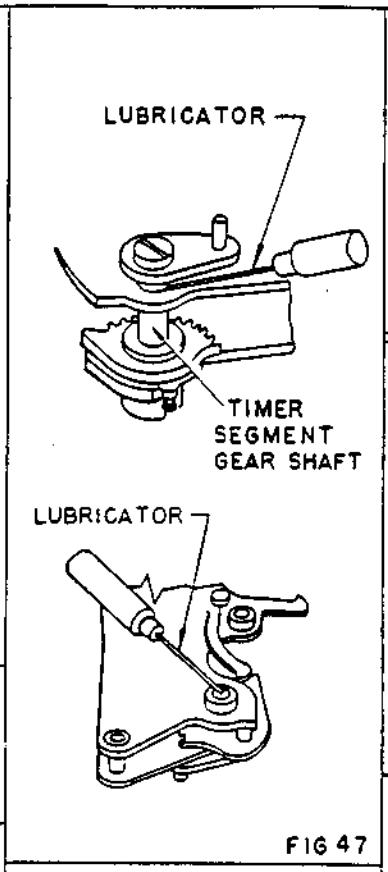


FIG 47

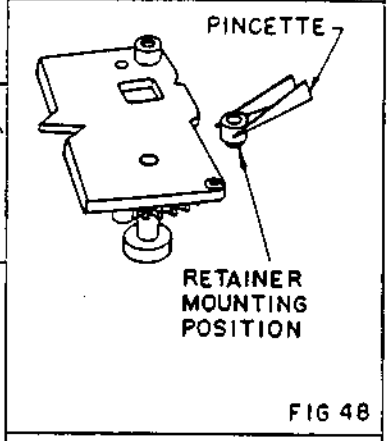


FIG 48

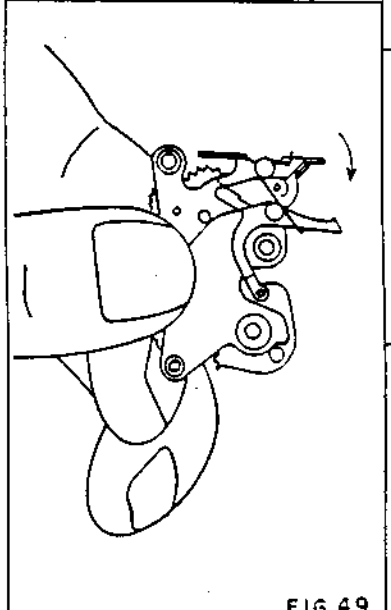


FIG 49

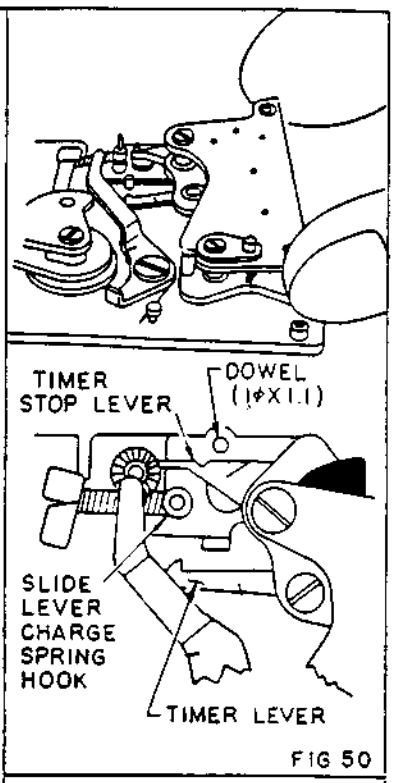


FIG 50

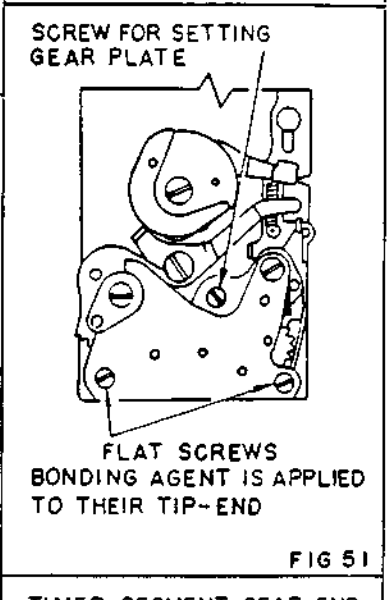


FIG 51

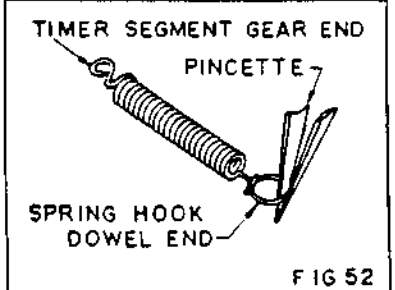


FIG 52

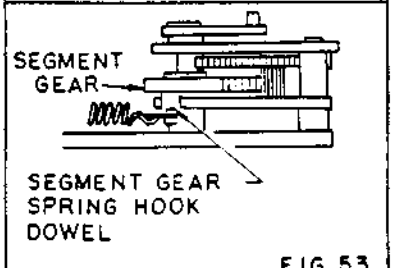


FIG 53

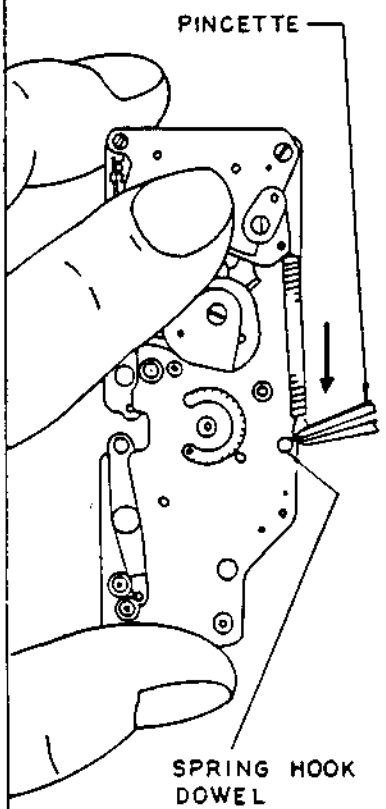
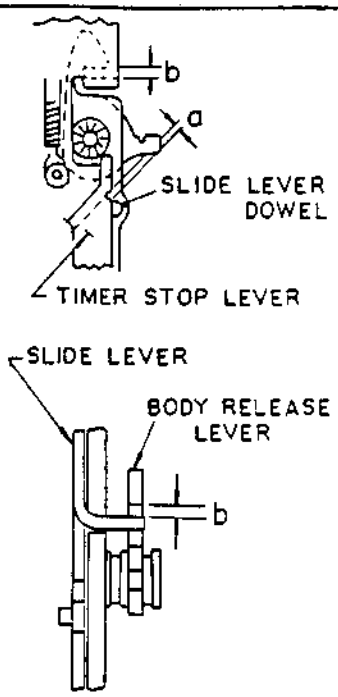


FIG 54



IN CASE a>b, TIMER MAY SOMETIMES START THE MOMENT DRIVING SHAFT IS SET.
CARE SHOULD BE TAKEN TO AVOID THIS.

FIG 57

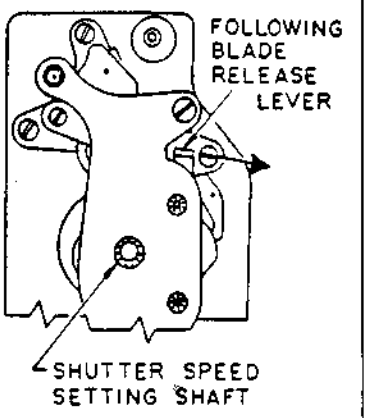


FIG 60

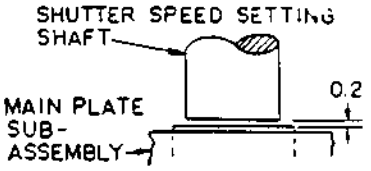


FIG 61

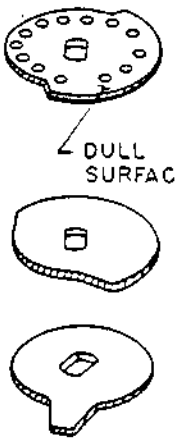


FIG 62

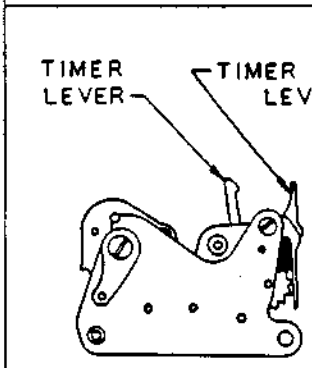


FIG 55

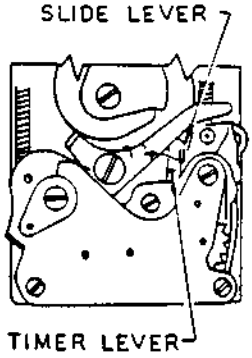
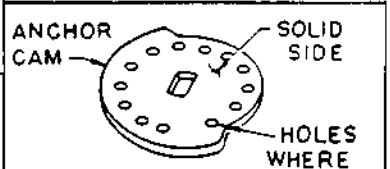


FIG 58



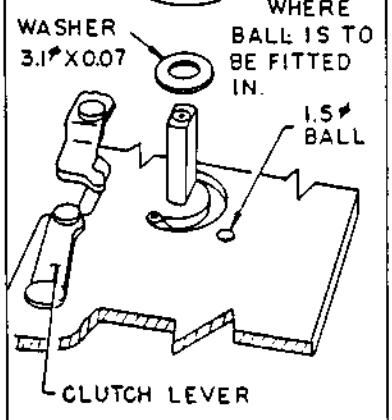


FIG 63

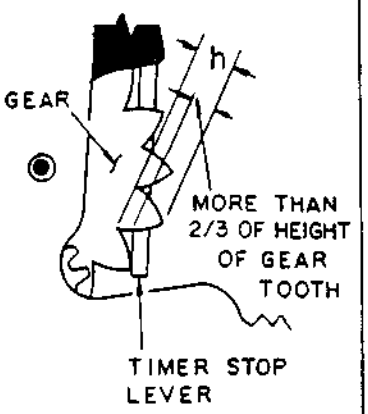


FIG 56

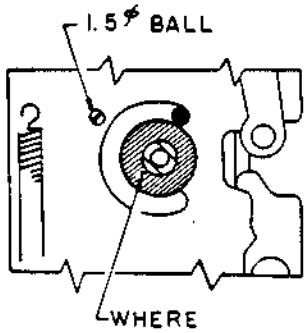


FIG 59

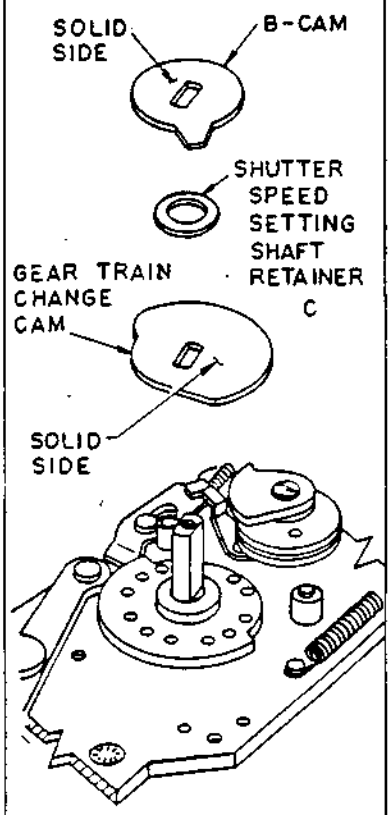


FIG 64

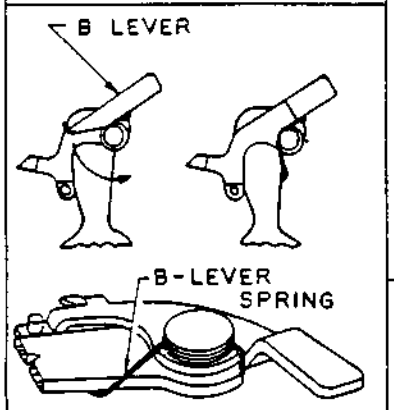


FIG 65

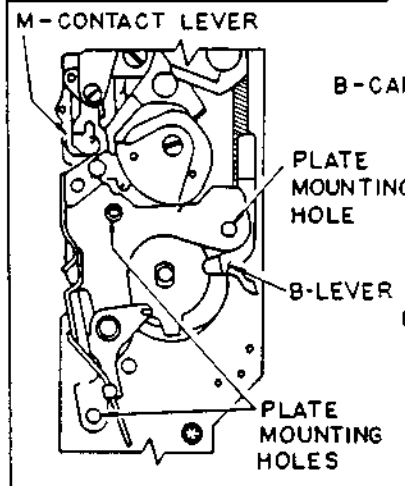
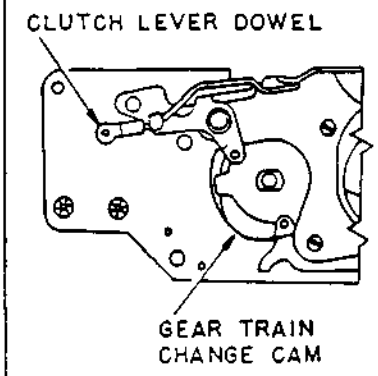


FIG 66



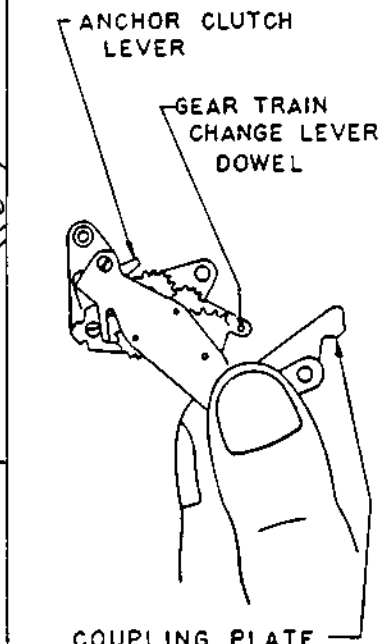
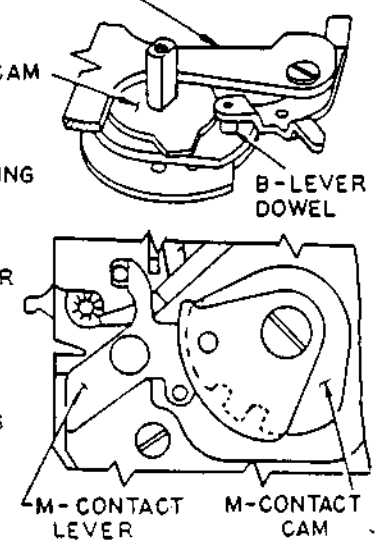


FIG 67


REMOVE B-LEVER SPRING FROM THE PLATE THE END NOW DISMOUNTED DROPS ONTO THE PLATEPOLE
B-CAM
B-LEVER DOWEL
M-CONTACT LEVER
M-CONTACT CAM

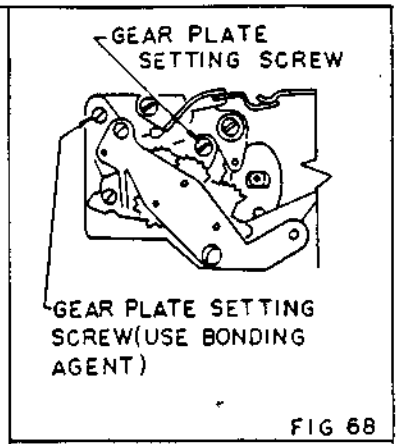


FIG 68

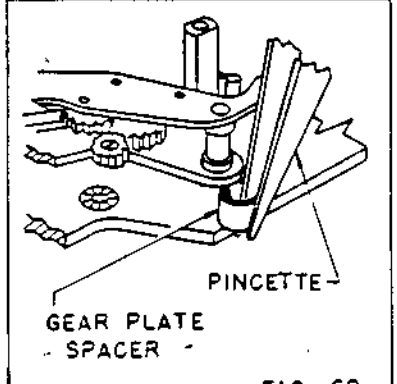


FIG 69

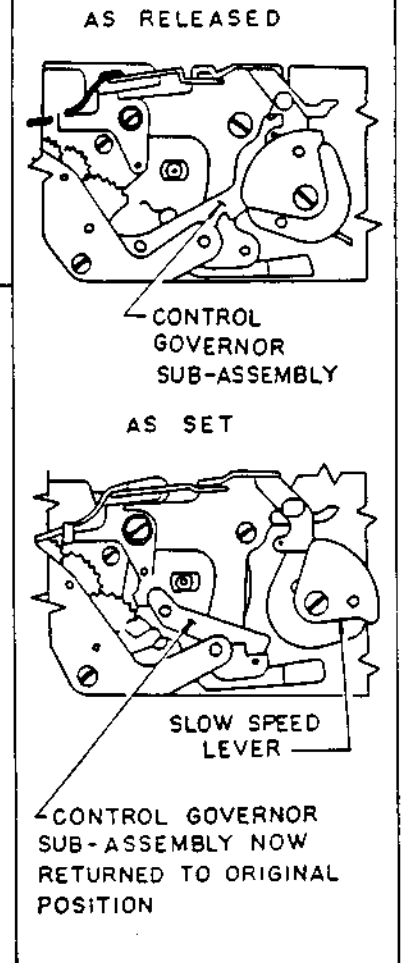


FIG 70

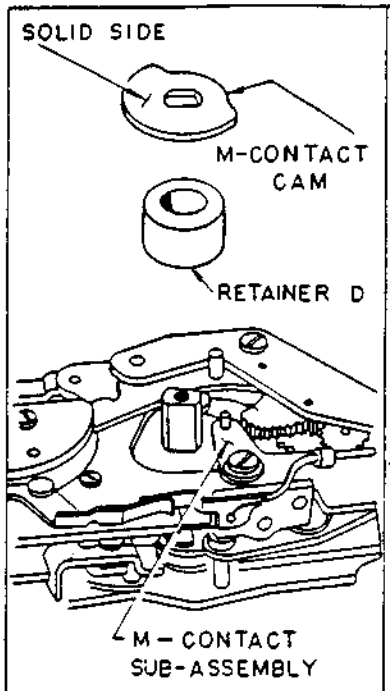


FIG 71

THIS DOWEL SHOULD BE IN CONTACT WITH M-CONTACT CAM. DOWEL SHOULD NEVER COME BENEATH THE CAM.

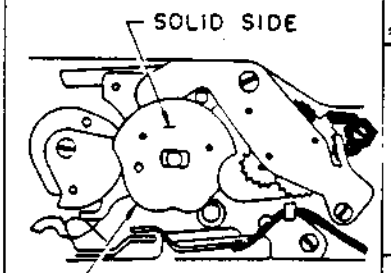


FIG 72

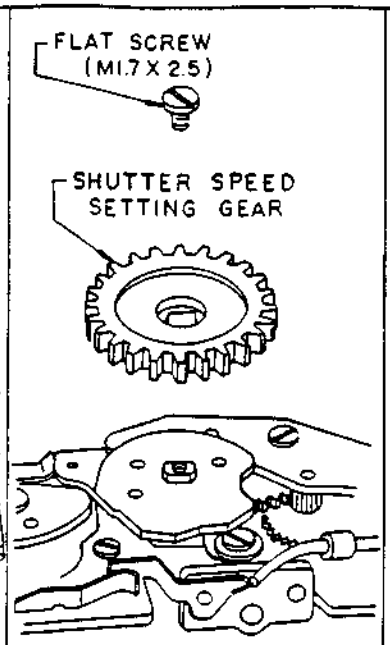


FIG 73

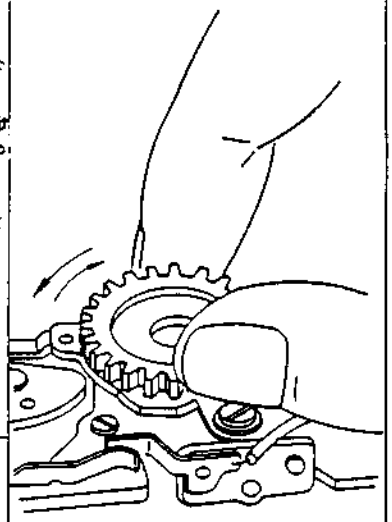
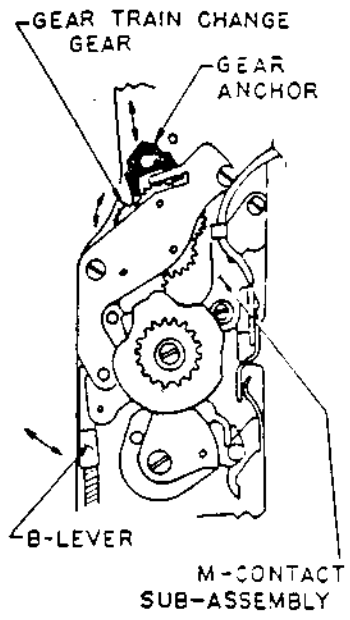


FIG 74



SETTING POSITION OF DRIVING SHAFT

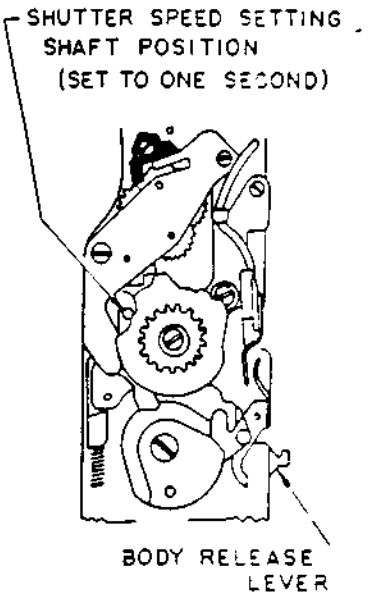


FIG 75